

# Sigma Xi Today

A NEWSLETTER OF SIGMA XI, THE SCIENTIFIC RESEARCH SOCIETY

## Sigma Xi Launches a Career Center

Sigma Xi, The Scientific Research Society has a new section on its website devoted to supporting the careers of members. Located at [www.sigmaxi.org](http://www.sigmaxi.org), on the home page's Opportunities section, the Sigma Xi Career Center is the place for members to post job openings, search for jobs or internships, and find, or volunteer as, a mentor.

Collectively, the center comprises three websites: one for job seekers and recruiters, one for internship seekers, and one for those who wish to create a profile as a mentor or mentee. In addition to searching for positions, Sigma Xi members may use the Career Center to manage résumés, create job alerts, and view tips on résumé writing and preparing for an interview. Active members receive a 28% discount to post a job and a reduced rate for contacting candidates who are interested in their job postings. Members can sign in to the Career Center using their SigmaXi.org login information.

In the Mentoring Center, mentors and mentees create profiles and explore others to connect with those who match the criteria they are seeking. It will allow students and young faculty to make valuable connections with mentors who have the best backgrounds to help them boost their careers. It also allows senior professionals to give back to the research community by mentoring rising junior researchers.

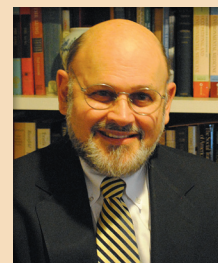
*Members are encouraged to send feedback on the Career Center by email to [membership@sigmaxi.org](mailto:membership@sigmaxi.org).*

Sigma Xi Today is edited by Heather Thorstensen and designed by Justin Storms.

## From the President

### The Professionalization of Scientific Research

Sigma Xi's highly influential *Honor in Science* is an essential text in scientific freedom and responsibility. I urge every member to read it and to share it widely. You can find it online by going to [www.sigmaxi.org/publications](http://www.sigmaxi.org/publications). The principles are timeless, but researchers need to revisit its message because the role in society played by scientists is changing. Scientific research is morphing, before our eyes, from its roots as a *vocation* (in the sense of an inclination or "calling," not a trade) to a *profession*, and professions come with regulation.



A vocation implies motivation by curiosity and personal commitment. It values free sharing of information and ethical values that are shared with society as a whole. Scientists are shifting to the model of a professional practitioner, providing skilled services to society, guided by society's priorities and funding incentives. Today, research is pursued for a purpose, the fruits of research may belong to a client, and compensation is tied to performance. Provision of research funds, salary support, and access to laboratories and research centers are all controlled and come with regulation, performance requirements, and expectations for compliance with institutional rules. The reality is that these days the research community is already regulated, directly or indirectly.

The migration of scientists from the vocational to the professional model raises the question of whether there is need for a formal code of ethics for scientific research. By definition, a profession is always bound by a code of ethics that is *deontological* in origin, that is handed down by the standards of the profession, and that is strict because of the harm that professionals can do to their clients. Standards are set by the professionals themselves, acting autonomously but explicitly regulated by the state, usually through licensure, and enforced by means that can be quite coercive, such as issuing sanctions or revoking a medical license.

Scholarly fields of study usually do not have true codes of ethics, but they often have codes of conduct to prevent abuse. In 1979, the American Association for the Advancement of Science (AAAS) considered developing a formal code of ethics for scientific research but decided instead to encourage each field to develop guidance that they thought was appropriate. A few years later, in 1984, a group of scientists attending an Uppsala University seminar in Sweden developed the Uppsala Code of Ethics for Scientists.

I'm not suggesting that scientists aren't bound by ethical standards—far from it and to believe otherwise is abhorrent. But professionalization calls for greater self-regulation with enforcement than most scientists are likely to find comfortable.

Society is pushing scientific research inexorably into a professional model. We need to understand what this implies and what it means for the future. Discussions about the role of scientists in society and especially on ethics, within and outside of Sigma Xi, have overlooked this evolving tension in what it means to be a scientist. It is, however, becoming our future.

A handwritten signature in black ink that reads "Tee L. Guidotti".

Tee L. Guidotti

## More Than 100 Students Receive Sigma Xi Grants

Sigma Xi, The Scientific Research Society congratulates 124 undergraduate and graduate students who were selected to receive research funding from the spring 2016 cycle of its Grants-in-Aid of Research program. Grants distributed in this cycle totaled \$108,038.

This cycle's awardees are from institutions across the United States as well as New Zealand, Canada, Mexico, Argentina, Germany, Kenya, the United Kingdom, Australia, and Nigeria. Their research fields include ecology, chemistry, biology, anthropology, physiology, hydrology, paleontology, psychology, engineering, social science, and physics.

A list of the awardees and their study titles is posted on the Sigma Xi website. The next deadline for grant applications is October 1, 2016.

Sigma Xi thanks the 29 reviewers who generously volunteered to review 957 grant applications that were received for this cycle. The volunteers were mostly Sigma Xi members, and many of them serve on the Society's Committee on Grants-in-Aid of Research, chaired by Peter Harries from North Carolina State University.

The Grants-in-Aid of Research program has supported student research since 1922, thanks to donors and des-

ignated funds from the National Academy of Sciences. A five-year countdown to the program's centennial year will kick off at the 2016 Sigma Xi Annual Meeting and Student Research Conference this November in Atlanta.



*If you would like to support student research by donating to the Grants-in-Aid of Research program, go to [www.sigmaxi.org](http://www.sigmaxi.org) and select "Donate Now."*

## Catch Up with Sigma Xi's First Chapters

To celebrate Sigma Xi's 130-year anniversary in 2016, learn about the first ten chapters and see what many of them are doing today.

### Chartered in 1886: Cornell University Chapter. Ithaca, New York

In 2015–2016, many of the Cornell Sigma Xi Chapter's graduate student members applied for both Grants-in-Aid of Research and internal Cornell Sigma Xi mini grants. At their annual mini symposium they celebrated research by previous student grant winners. The chapter held a curriculum vitae workshop and a research poster session for undergraduates. They also welcomed new graduate students to their chapter leadership team.



Sigma Xi member Shirley Ann Jackson received the National Medal of Science earlier this year from President Barack Obama. Image courtesy of Rensselaer.

### Chartered in 1887: Rensselaer Polytechnic Institute Chapter. Troy, New York

Shirley Ann Jackson, president of Rensselaer Polytechnic Institute and Sigma Xi member, received the National Medal of Science in May 2016 from U.S.



One of the poster sessions at Union College's 2016 Steinmetz Symposium. Image courtesy of Harvey Vlahos of Vlahos Communications.

President Barack Obama. The medal is the highest honor for scientific achievement bestowed by the U.S. government.

### Chartered in 1887: Union College Chapter. Schenectady, New York

More than 80 Union College undergraduate researchers from 12 different disciplines took Sigma Xi's pledge to join the Society in the spring of 2016. Many of these students had presented their findings at regional and national scientific conferences as well as Union's own Steinmetz Symposium. Andrew Glaser, a senior biochemistry major, was awarded the chapter's annual Sigma Xi Research Prize for his investigation of how the industrial chemical perfluorooctanoic acid (PFOA) binds to a protein in human blood.

### Chartered in 1890: University of Kansas Chapter. Lawrence, Kansas

The KU Chapter of Sigma Xi is working to engage local students and community members in research activities. For a number of years, they have partnered with the KU Office of Graduate Studies and the KU Center for Undergraduate Research to provide student research awards for meritorious contributions at KU's annual Graduate Research Competition and Undergraduate Research Symposium. This fall, they will sponsor a workshop on sharing scholarly activity with the public.

### Chartered in 1895: Yale University Chapter. New Haven, Connecticut

### Chartered in 1896: University of Minnesota Chapter. Minneapolis, Minnesota

The University of Minnesota Chapter recently held its 120th Annual Meeting. To celebrate, the chapter looked back at its history, creating a poster of buildings and streets on campus that have been named for members. "Our task now is to see that this tradition of excellence and service continues," wrote Nancy Herther, the chapter's president. The chapter is working on goals to increase its membership and its service to students and the university.

**Chartered in 1897: University of Nebraska Chapter. Lincoln, Nebraska**

The University of Nebraska Chapter hosted Dr. E. William Colglazier at its annual luncheon and chapter meeting in April 2016. Colglazier is the editor-in-chief of *Science & Diplomacy* and senior scholar in the Center for Science Diplomacy at the American Association for the Advancement of Science (AAAS). The title of his talk was, "The Role of Science, Technology, and Innovation for Diplomacy and Sustainable Development." Approximately 70 members attended the luncheon hosted jointly by UNL's Sigma Xi Chapter and Office of Research and Economic Development.

**Chartered in 1898: Ohio State University Chapter. Columbus, Ohio**

For more than a decade, the Ohio State Chapter has awarded Grants-in-Aid of Research to student researchers. This year, three undergraduates received \$500 and three graduate students received \$1,000.



A student being recognized as a recipient of the Ohio State University Chapter's Grants-in-Aid of Research program.

The chapter also presented the \$200 Student Innovator of the Year Award. They also select students for awards at State Science Day, sponsor a Meet a Scientist program with local

schools, co-sponsor monthly Science Cafés, and recently initiated informal seminar/lab visits, called Science 'n' Suds, to encourage cross-talk among members. For the 117th time, their annual banquet brought together scientists and engineers to recognize the top student researchers on campus.

**Chartered in 1899: University of Pennsylvania Chapter. Philadelphia, Pennsylvania**

Although the University of Pennsylvania Chapter is in need of revitalization, Pennsylvania as a state has more than 10 active chapters, including the West Chester University Chapter, which earned its charter in April 2016.

**Chartered in 1900: Brown University Chapter. Providence, Rhode Island**

For many years, the Brown University Chapter has held Sigma Xi's title for the chapter that inducts the most new members.

## Procter Prize Winner Pioneers Methods for Safer Air Travel



Jan Achenbach of Northwestern University will receive Sigma Xi's William Procter Prize for Scientific Achievement at the Annual Meeting and Student Research Conference this November in Atlanta.

More than 2 million passengers boarded flights on average each day in the United States last year. The lives of those who travel by air are significantly more safe thanks to engineering research by Sigma Xi's 2016 William Procter Prize for Scientific Achievement winner Jan Achenbach of Northwestern University. He will receive the prize and give a lecture at the Sigma Xi Annual Meeting and Student Research Conference this November in Atlanta.

Achenbach was one of the researchers funded to help the Federal Avia-

tion Administration (FAA) after disaster struck on April 28, 1988. Aloha Airlines Flight 243 was flying between islands of Hawaii when the roof departed from the plane, killing one flight attendant and seriously injuring eight people. Small cracks had joined together, which eventually led to the roof loss. The airline's maintenance program had failed to detect the plane's structural damage, and the FAA needed to know how to prevent such a failure from happening again.

Achenbach approached the challenge by using what he learned during his PhD studies. At Stanford University, he had investigated how waves move through solid objects, and later he wrote *Wave Propagation in Elastic Solids*. These projects were the foundation for his ability to pioneer methods in nondestructive evaluation, a method of testing an object's structural integrity without taking it apart. Instead, ultrasound is used to penetrate a solid object, and the sound waves are reflected or scattered by flaws, such as cracks or corrosion.

When Achenbach began working on nondestructive evaluation, tests could

only detect if a flaw existed. Achenbach developed a procedure that provided more details, identifying the flaw as well as its size and location. Today, nondestructive evaluations can determine if a repair is needed on a structure and it's used for structural health monitoring. Sensors may be permanently installed on a critical structure to wirelessly transmit information about its structural integrity to a receiving point.

"It is a field that makes sure that planes are safe—at least safe from structural failure—that bridges are safe and that nuclear reactors are safe," he said.

His work put him in the elite class of researchers who have received both the National Medal of Technology and Innovation and the National Medal of Science—the United States' top prizes for science and technological achievements.

To watch an interview with Achenbach, go to <https://www.sigmaxi.org/programs/prizes-awards/william-procter/award-winner/jan-achenbach>.

## McGovern Award Winner Supports Scientific Invention



McGovern Award winner Paul Sanberg

Sigma Xi's 2016 John P. McGovern Award, given in large part to recognize a researcher's impact on society, will go to an advocate for scientists getting their discoveries into the world.

Paul Sanberg founded the National Academy of Inventors (NAI), which supports scientists who patented, or want to patent, their research. He is president of the NAI, which is composed of nonprofit research organizations and research universities that honor and support their inventors.

Sanberg has traveled the world to talk about the importance of inventing on behalf of the NAI and as a AAAS-

Lemelson Invention Ambassador. His 100 patents worldwide came after he learned how patents can offer protection to the investment that universities, companies, and governments make in research.

Nonacademic funding is critical to his neuroscience research. Sanberg was studying Parkinson's and Huntington's disease when his father had a stroke. With few advanced therapies on the horizon, Sanberg shifted to investigating stroke and how to treat it.

Today, he is University of South Florida's senior vice president for research, innovation, and economic development and executive director of USF's Center of Excellence for Aging and Brain Repair. His work has been critical to understanding and developing new pharmaceutical and cellular therapies for brain damage, such as stroke, Alzheimer's, and Parkinson's disease. His research contributed to understanding that too many of certain

excitatory neurotransmitters carrying information to brain cells can kill the cells. He also led a research team that demonstrated stem cells from bone marrow and umbilical cord blood can be made into neural cells to help repair a damaged brain. The stem cell therapy showed significant brain recovery in animal studies. It is now in human trials to help prove that it works.

Stem cells could be a cure for brain damage from stroke and degenerative diseases, but funding has to come from private companies and governments to continue moving the research forward, Sanberg said.

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*Sanberg and Tiago Falk (see below) will receive their awards and give keynote lectures at the Sigma Xi Annual Meeting and Student Research Conference, November 10–13 in Atlanta. To watch Sanberg's full interview, go to <https://www.sigmaxi.org/programs/prizes-awards/john-mcGovern/award-winner/paul-sanberg>.*

## Young Investigator Develops Better Human–Machine Interactions

People send out signals constantly through their mood, behavior, physiology, and even their environment. It's the job of Sigma Xi 2016 Young Investigator Award Winner Tiago Falk and his lab to investigate and enhance how those signals are received and used intelligently by machines for the betterment of humankind.

Falk is an associate professor at the Institut National de la Recherche Scientifique at the University of Quebec in Canada and director of the Multimedia/Multimodal Signal Analysis and Enhancement (MuSAE) Lab. The lab works closely with Canadian and international companies so that its research outcomes have practical applications.

One area of focus is on applying intelligent machines to assist clinicians with improved health diagnostics. For example, Falk's team is developing a low-cost method of detecting a person's early risk for developing Alzheimer's disease via the use of games, eye tracking, and por-

table neurotechnologies. The player performs a virtual navigation task known to elicit activity in specific parts of the brain that are known to be affected early by Alzheimer's disease. A second application is on the use of smartphone cameras and microphones to remotely monitor patients with depression.

The lab is also developing technology for adaptive multimedia communications. For example, physiological signals have been used to monitor a user's perceptual experience—such as emotion, fatigue, or pleasantness—with new multimedia technologies, such as a video streaming service, thus allowing service providers to adjust system parameters in real-time to maximize user experience.

Falk's background is a mix of engineering domains. A native of Brazil, he completed his PhD at Queen's University in Canada by working in speech coding and processing. Then, during his post-doctoral fellowship at Holland Bloorview Kids Rehabilitation Hospital in Toronto,



Young Investigator Awardee Tiago Falk

he worked on assistive technologies, including brain–computer interfaces, for children with multiple severe disabilities. There, he developed a device nicknamed “the Hummer” that allowed children to use hums as control signals to drive powered wheelchairs, as well as control a virtual keyboard to communicate with their loved ones.

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*To learn more about Falk's research, visit <https://www.sigmaxi.org/programs/prizes-awards/young-investigator/award-winner/tiago-h.-falk>.*